

Please add the following new claims:

*g<sup>14</sup>*  
Claim 46. (New). A process for bleaching kraft-digested pulp which comprises a sequence of bleach stages selected from the group consisting of  $D_0E_{O+P}D_1P$ ,  $D_0E_P D_1P$  and  $D_0/C E_P D_1P$  with an optional washing step between the  $D_1$  and P stages of each wherein a chelating agent is added during the  $D_1$  stage and/or during the optional wash between the  $D_1$  and P stages in an amount and under conditions which are sufficient to produce a bleached pulp having substantially improved brightness, viscosity and yield as compared to pulp bleached using the same sequences without the chelating agent addition.

Claim 47 (new) The process of Claim 46 wherein the chelating agent is added during the  $D_0$  and  $D_1$  stages.

Claim 48 (new) The process of Claim 46 wherein the optional wash is employed and the pulp is treated with the chelating agent during the wash prior to treatment with the peroxide bleach agent.

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#### REMARKS

Claims 1-7, 10-11, 13-17, 19-26, 29-37, 39-42 and 44-48 are in the case.

In Applicant's parent application Serial No. 09/149,313, Claims 1 - 7, 10, 11, and 13 - 17 were rejected for indefiniteness. The Examiner contended that the term "second chlorine dioxide stage" was indefinite as no "first chlorine dioxide stage" was recited.

Further, Claims 1 - 7, 10, 11, 13 - 17, 19 - 26, 39 - 42, and 44 - 48 were rejected on the merits as being obvious over the Carmichael et al. article in view of European application EP 622, 491.

Claims 19 - 26, 29 - 35, and 46 - 48 were rejected as obvious over Carmichael et al. and EP 622,491 in further view of Prough.

Claims 36, 37, 39 - 42, and 44 - 45 were rejected as unpatentable over Carmichael et al., EP 622, 491, and either Basta et al. or Borezee.

Each of the rejections is respectfully traversed. As demonstrated below, none of the cited references, either alone or in combination, would have suggested claimed invention to the person of ordinary skill in the art at the time of the invention.

No New Matter is Entered by the Above Amendments to the Claims

When Applicant first proposed an amendment to the transition of the claims to recite that the additive in the second chlorine dioxide stage "consists essentially" of a chelating agent, the Examiner somewhat surprisingly contended that this amendment raised the issue of new matter.

The Examiner contended the specification does not teach the use of the chelating agent by itself and hence cannot support the cited "consisting essentially of" language in the specification. As the Examiner knows, the "consisting essentially of" transition closes the claim, or in this case, the portion of the claim, only with respect to additional materials which would materially affect the basic and novel characteristics of the claimed invention. See In re Herz, 190 USPQ 461, 463 (CCPA 1976). In the present invention, the pH is maintained within the desired range over the course of the chelate addition and so in some instances a small amount of pH adjustment chemicals such as caustics or mineral acids may be added for pH control. However, since the chelating agent is being added to a chlorine dioxide stage which is already strongly acidic, it is believed that the addition of the chelating agent will ordinarily have little or no effect on the pH of the stage.

In the context of a novel process employing a chelating agent in chlorine dioxide bleaching stages, it is Applicant's contention that addition of pH-modifying chemicals would not materially affect the basic and novel characteristics of the claimed invention and hence should not be foreclosed by the language "an additive consisting essentially of a chelating agent". However, in order to advance and expedite prosecution of the case, Applicant has amended the claims to remove the language of concern. It is submitted that this amendment overcomes the alleged new matter problem.

The Examiner also contended the specification describes use of a magnesium salt with the chelating agent and does not teach use of a chelating agent by itself. To support his contention, the Examiner points to page 3, lines 7 - 16 of the application which states:

The process comprises maintaining the pulp at a consistency in the range of from about 0.5% to about 40% and maintaining the pH in the range of from about 1 to about 9. The pulp is then bleached with a chlorine compound in a bleaching stage. During the bleaching or before a washing stage, the pulp is contacted with from about 0.01 wt.% to about 1 wt.% chelating agent. The amount of chelating

agent used is based on the dry weight of the pulp. This process has been found to significantly reduce the amount of absorbable organic halide in the bleached pulp.

Applicant is uncertain how the Examiner interprets this section as suggesting the necessity of using magnesium together with a chelate in chlorine dioxide bleaching stage since it does not even mention magnesium.

Perhaps the Examiner intended to refer to lines 7 - 16 of page 7 wherein it is stated that when the chelate agent is added "during an extraction stage", a viscosity protection agent such as a magnesium salt may be added to the extraction stage as well. However neither this section nor any other portion of the specification teaches the necessity of using a magnesium salt together with a chelating agent in a second chlorine dioxide bleaching stage. What the specification does support is the novel use of a chelating agent in a second chlorine dioxide bleaching stage.

Accordingly, Applicant believes the matter raised by the Examiner concerning the use of magnesium is not really an issue, and that Applicant's claims which do not specifically call for or require magnesium are entirely proper.

#### The Indefiniteness Rejection is Overcome by Amendment

In the '313 application, the Examiner rejected Claim 1 and its dependent claims for indefiniteness contending that the recitation of a "second" chlorine dioxide stage without the recitation of a "first" chlorine dioxide stage rendered the claim indefinite. While Applicant believes those skilled in the art would easily recognize that an "initial chlorine containing" stage can be a first chlorine dioxide stage, Applicant has nonetheless amended Claim 1 to indicate that the initial chlorine-containing stage is a first chlorine dioxide-containing stage. It is believed that this provides a sufficient basis to refer to the later stage as a second chlorine dioxide stage and hence overcomes the rejection. Applicant therefore respectfully requests the indefiniteness rejections be withdrawn.

#### The Claimed Invention Patentably Distinguishes Over the Cited Art

Applicant will first address the hypothetical combination of the Carmichael et al. article and the EP 622, 491 application cited against Claims 1-7, 10, 11, 13-17, 19-26, 29-37, and

44-48. This rejection fails for at least two reasons. First, the Carmichael et al. and EP 622,491 references are not properly combinable to disclose or suggest the claimed invention. Second, even if the two references were combined, the resultant process would require a magnesium and calcium replenishment step which is not a requirement of the claimed invention.

Carmichael et al. describes a process of peroxide bleaching following a chlorine dioxide stage in bleaching sequences of the type C/D E<sub>op</sub>DP. However, the reference contains no teaching or suggestion of the use of a chelating agent in a chlorine dioxide bleaching stage. In fact, Carmichael, et al. makes no mention of using a chelate to complex damaging metals whatsoever.

EP 622,491 is cited in an attempt to overcome this deficiency in the Carmichael et al. reference. EP 622,491 teaches a pre-bleaching treatment in which a pulp, prior to any other bleaching stage, is treated under acidic conditions with a metal complexing agent. The acid conditions for the addition of the complexing agent may be provided by an initial "chlorine dioxide delignification treatment". (Page 4, lines 51 - 56). Following treatment with the complexing agent, the pulp is treated, still under acidic conditions, with magnesium and calcium compounds to replenish magnesium and calcium ions previously removed from the pulp (page 2, lines 43 - 48). Thereafter, the pulp is bleached in an alkaline peroxide bleaching stage (page 3, lines 25 - 27).

EP 622,491 teaches that other bleaching stages may follow the peroxide stage. That is, after the peroxide stage, "the pulp may also be finally bleached to a higher brightness in one or more stages, e.g., by means of hydrogen peroxide, ozone, sodium dithionite, or chlorine dioxide. Final bleaching can also include alkaline extraction stages which may be fortified by peroxide and / or oxygen." (Page 5, lines 41 - 44). Thus, EP 622,491 does not suggest the use of a complexing agent or chelate followed by a peroxide bleaching stage at the conclusion of a bleaching sequence with earlier chlorine dioxide and alkaline extraction stages preceding the chelating treatment.

EP 622,491 and Carmichael et al. cannot reasonably be combined. In order to establish a prima facie case of obviousness, there must be some teaching, suggestion, motivation, or incentive in the applied prior art that would have led one of ordinary skill in the art to combine

the relevant teachings in the proposed manner to arrive at the claimed invention. See, e.g., Ex parte Levengood, 28 USPQ2d. 1300 (Bd. Pat. App. 1993). In this case, not only is there no incentive or motivation to combine the two references, the solutions proposed by the two references take directly opposite approaches and cannot be combined. Carmichael et al. teach the use of a DP sequence only at the end of a bleaching sequence. Carmichael et al. state that peroxide can be used a final stage and that “the use of a final peroxide stage may be an excellent alternative.” (Page 90, col. 2, 3<sup>rd</sup> full paragraph). On the other hand, the entire thrust of EP 622,491 is towards the use of a chelating agent in a prebleach treatment. EP 622,491 specifically teaches use of further D and E stages after the P stage, not before the stage. EP 622,491 repeatedly stresses use of the acidic complexing agent treatment as an initial treatment. The treatment is said to occur “prior to the bleaching” (Abstract, line 2).

Since Carmichael et al. and EP 622,491 teach diametrically opposed technologies, one skilled in the art would not have even attempted to combine the two and would not have been lead by EP 622,491 to use a complexing agent in the D<sub>2</sub> stage of a D<sub>1</sub>D<sub>2</sub>P or D<sub>1</sub>ED<sub>2</sub>P sequence according to the present invention.

But even if the Carmichael et al. and the EP 622,491 references were combined, which they would not be, the resultant process would still not suggest the claimed invention. According to EP 622,491, it is necessary to replenish magnesium and calcium ions removed from the pulp by the complexing agent prior to treating the pulp in the peroxide bleaching sequence. The magnesium and calcium replenishment is carried out under acidic conditions either at the end of the chelating treatment or in a separate step intermediate the chelating treatment and the subsequent P stage.

According to the claimed invention, no such ion replenishment is required. The only necessary chemicals in the D stage, besides the chlorine dioxide itself and perhaps minor amounts pH adjusters such as sulfuric acid or sodium hydroxide, is the complexing agent. Further, the pulp proceeds from the D stage directly to the P stage with only an optional water wash in between. It is not required in practicing the invention to replenish magnesium and calcium prior to the alkaline peroxide bleaching stage. This omission in the present invention of a step which is critical to the teaching of the prior art renders the invention patentably

distinguishable over the hypothetical combination of EP 622, 491 and Carmichael et al. Therefore, it is respectfully requested that the rejections of the claims based on this combination cannot be sustained, and must be withdrawn.

Applicant now turns to the rejection of Claims 19 -26, 29 - 35, and 46- 48 based on Carmichael et al., EP 622,491 and Prough. The above comments regarding the deficiencies of EP 622,491 and Carmichael et al. are equally applicable here, and the Prough patent does not cure these problems. Prough is directed exclusively to the treatment of pulps with multiple oxygen bleaching stages and provides no instruction whatsoever regarding the use of a chelating agent in connection with a terminal DP bleaching subsequence. Hence, the claims are still patentably distinguishable over the combination of Prough, Carmichael et al. and EP 622,491 and it is respectfully requested that the rejections of the claims based on these references has no merit whatsoever.

Lastly, Applicant addresses the rejections of Claim 36 and its dependent claims based on EP 622491, Carmichael et al. and the Basta et al. and Borezee patents. The Basta et al. and Borezee patents add nothing of substance to the disclosure of EP 622,491 and the Carmichael article, and they certainly do not satisfy the deficiencies in the teachings of these two references so as to render the claimed invention obvious.

Basta et al. disclose a process in which a pulp is treated with a complexing agent in an initial stage, then bleached with peroxide, then further treated with halogen-containing bleaching chemicals. The initial step in which the pulp is treated with complexing agent is essentially halogen-free and it certainly bears no resemblance at all to a D<sub>2</sub> stage as it is known to those of ordinary skill. Thus, this reference is essentially redundant of EP 622,491 in that the disclosure is directed to an initial acidic pretreatment with complexing agent followed by peroxide bleaching, and then further bleaching stages. As discussed above, this teaches away from a bleaching sequence in which the final two stages are a second chlorine dioxide and a peroxide stage and in which a complexing agent is used in the second D stage.

Borezee discloses chlorine dioxide bleaching followed by peroxide bleaching, but fails to disclose the addition of a complexing agent or chelate in the chlorine dioxide stage. Thus, the Borezee patent is cumulative of the Carmichael et al. article, and the claimed invention





Continuation of S.N. 08/617,612

patentably distinguishes over it for at least the same reasons it distinguishes over Carmichael et al. article.

In light of the foregoing remarks and the deficiencies of the cited references applied against the claims in Applicant's parent case, it should now be apparent to the Examiner that the teachings of the references do not in any way suggest treating pulp with a chelating agent in the manner claimed. Applicant's process enables reduced use of chlorine-containing compounds with improved pulp properties by novel and strategic use of chelating agents. The improved results are truly unexpected, and the claims therefore patentably distinguish over the cited references.

Accordingly, Applicant respectfully submits that all rejections are completely overcome and should be withdrawn, and that the case should be allowed to issue.

Respectfully submitted,

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